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UTILITY PATENT APPLICATION TRANSMITTAL
(Only for new nonprovisional applications under 37 CFR 1.53(b))

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Docket No. : 32711/CM/P369
Inventor(s) : Woodrow W. Pearce
Title : VENTING CAP
Express Mail Label No. : EL287005485US

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Date: March 29, 1999

1. X **FEE TRANSMITTAL FORM** *(Submit an original, and a duplicate for fee processing).*

2. **IF A CONTINUING APPLICATION**
   ___ This application is a of patent application No. .
   ___ This application claims priority pursuant to 35 U.S.C. §119(e) and 37 CFR §1.78(a)(4), to provisional Application No. .

3. **APPLICATION COMPRISED OF**

   Specification
   15 Specification, claims and Abstract (total pages)

   Drawings
   6 Sheets of drawing(s) (FIGS. 1 to 12)

   Declaration and Power of Attorney
   X Newly executed
   ___ No executed declaration
   ___ Copy from a prior application (37 CFR 1.63(d))(for continuation and divisional)

4. ___ **Microfiche Computer Program** *(Appendix)*

5. ___ **Nucleotide and/or Amino Acid Sequence Submission** *(if applicable, all necessary)*
   ___ Computer Readable Copy
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   ___ Statement verifying identity of above copies

6. **ALSO ENCLOSED ARE**
   ___ Preliminary Amendment
   ___ A Petition for Extension of Time for the parent application and the required fee are enclosed as separate papers
   X Small Entity Statement(s)
   ___ Statement filed in parent application, status still proper and desired
   ___ Copy of Statement filed in provisional application, status still proper and desired

UTILITY PATENT APPLICATION TRANSMITTAL
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Docket No.: 32711/CM/P369

____ An Assignment of the invention with the Recordation Cover Sheet and the recordation fee are enclosed as separate papers
____ This application is owned by pursuant to an Assignment recorded at Reel , Frame
____ Information Disclosure Statement (IDS)/PTO-1449
____ Copies of IDS Citations
____ Certified copy of Priority Document(s) (*if foreign priority is claimed)*
____ English Translation Document *(if applicable)*
_X_ Return Receipt Postcard (MPEP 503) (should be specifically itemized).
____ Other

7. CORRESPONDENCE ADDRESS

CHRISTIE, PARKER & HALE, LLP, P.O. BOX 7068, PASADENA, CA 91109-7068

Respectfully submitted,

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CM/llw
Enclosures

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Application or Patent No.	:	**Filed Herewith**	(626) 795-9900
Filed or Issued	:	Filed Herewith	
Entitled	:	VENTING CAP	

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR § 1.9(f) and § 1.27(b))
INDEPENDENT INVENTOR

As a below-named inventor, I declare that I qualify as an independent inventor as defined in 37 CFR § 1.9(c) for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled **VENTING CAP** described in

__X__ the specification filed herewith.

_____ Application No. __ filed __

_____ Patent No. __ issued __

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR § 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR § 1.9(d) or a nonprofit organization under 37 CFR § 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed, or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below.

__X__ No such person, concern or organization.

_____ Persons, concerns or organizations listed below. (NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. 37 CFR § 1.27)

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR § 1.28(b))

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
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both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Woodrow W. Pearce	Woodrow W. Pearce	3-12-99
Name of Inventor	Signature	Date

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32711/CM/P369

VENTING CAP

BACKGROUND OF THE INVENTION

This invention relates to bottle caps which when screwed on a bottle allow for the venting of gases generated in the bottle.

Shampoos, cold creams and other cosmetics are typically prepared under heat and are poured into plastic containers such as bottles usually while still hot. The plastic bottles containing the hot cosmetic material are capped, trapping the hot gases generated by the hot cosmetics. When capped, a lower or inner surface 10 of the cap top seats against the mouth 12 of the bottle 14 forming a seal (FIG. 1). Consequently, if capped immediately after filling, the gases generated by the hot cosmetics generate a pressure within the bottle. The hot pressurized gases cause the plastic bottle to form flat spots. This condition is commonly referred to as "bottle paneling." Moreover, the increase in pressure within the bottle may cause the bottles to explode creating a hazardous condition. One way to avoid pressure build-up and paneling is to fill the bottles while the cosmetics are cold. When cold, the cosmetics are thick and viscous, thus, having reduced fluidity. Consequently, the filling process is slowed requiring a longer time to fill the bottles.

A typical way of avoiding pressure build-up and paneling is to fill the bottles with the hot cosmetics and wait for a period of time, typically in the order of 24 hours, before capping the bottles. This approach also slows down the filling process adding to production costs.

Another common way of preventing bottle paneling, incorporates a grooved liner fitted into the bottle cap. The liner typically has a surface that has grooves forming a cross-hatched pattern as well as holes penetrating its thickness. The bottom surface of the liner is covered with a gas permeable layer. When fitted into the cap, the grooved surface of the liner is mated to the lower surface of the cap top. When the cap is screwed onto the bottle, the holes provide a path for gas generated within the bottle to travel to the grooves which provide a path to the inner circumference of the cap from where the gas can escape through the space created between the cap rim and the bottle neck to the exterior of the bottle.

Thus, there is a need for a fail safe bottle cap that would allow for venting of gases generated in a bottle so as to allow for the capping of bottles immediately after being filled with hot liquids.

SUMMARY OF THE INVENTION

A bottle cap is provided which when screwed on to a bottle provides a path for gases generated in the bottle to escape from the bottle through a spiraling space formed in the threaded region between the inner surface of the bottle cap rim and the outer surface of the bottle neck.

The bottle cap includes one or a plurality of concentric preferably circular ridges formed on the inner surface of the cap top. Each of these ridges is designed to sit on the rim of the bottle mouth when the cap is threaded onto the bottle neck. A slot or multiple slots are formed in each ridge. The slots between adjacent ridges may be staggered or may be aligned.

In an alternate embodiment, grooves are formed on the inner surface of the cap top. When the bottle cap is threaded onto the bottle neck, the grooves extend from a location on the inner surface of the cap top within the mouth of the bottle neck to a location extending to the outer edge of the mouth rim or beyond the mouth rim of the bottle neck.

With every embodiment, when the cap is threaded onto the bottle, gases generated within the bottle can escape across the rim of the mouth of the bottle neck through the slots or through the grooves and through the threaded region between the inner surface of the cap rim and the outer surface of the bottle neck to the exterior of the bottle.

In an alternate embodiment, the ridges or grooves are formed on a disc which is fitted in the cap over the cap top inner surface. The disc may be glued on the cap inner surface.

A liner may also be used with the caps of the present invention. This liner is typically fitted over the inner surface of the cap top. An opening is formed in the liner to allow for gases generated in the bottle to penetrate the opening and escape through the slots or grooves formed on the cap top or disc.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial cross-sectional view of a typical cap threaded onto a bottle neck.

FIG. 2 is a partial cross-sectional bottom view of a cap of the present invention depicting a ridge formed on the inner surface of the cap top having slots formed therethrough.

FIG. 3A is a partial cross-section of a cap of the present invention threaded on to a bottle neck.

FIG. 3B is a perspective view depicting the flow of gases through the threaded space formed between the bottle neck outer surface and the cap inner surface.

FIG. 4 is a partial cross-sectional bottom view of a cap of the present invention having multiple slotted concentric ridges formed on the inner surface of the cap top.

FIG. 5 is a partial cross-sectional bottom view of a cap of the present invention having multiple concentric ridges formed on the inner surface of the cap top having staggered slots formed therethrough.

FIG. 6 is a partial cross-sectional bottom view of a cap of the present invention having grooves formed on the inner surface of the cap top.

FIG. 7 is a perspective view of a liner for used with any of the caps of the present invention.

FIG. 8 is a side view of a cap having a flip top.

FIG. 9 is a side view of a cap having a moveable spout.

FIG. 10 is a cross-sectional view of cap fitted with a disc according one embodiment of the present invention.

FIG. 11 is a cross-sectional view of cap fitted with a disc according to an alternate embodiment of the present invention.

FIG. 12 is a top view of the cap with disc of the embodiment show in FIG. 11.

DETAILED DESCRIPTION OF THE INVENTION

A cap typically consists of a disc shaped top portion 24 from which extends an annular wall or rim 26 (FIG. 2). Threads 28 are formed on the inner surface 30 of the annular wall 26 for threading on threads 32 formed on the outer surface 34 of a bottle neck 36 (FIG. 3). The end of the bottle neck has a mouth 40 defined by a rim 42.

In a first embodiment, the cap of the present invention includes a circular ridge 44 formed on the inner surface 46 of the cap top portion (FIG. 2). The circular ridge diameter is smaller than the outer diameter of bottle rim, but greater than the inner diameter of the bottle rim defining the mouth. In this regard, when the cap is threaded onto the bottle neck, the ridge 44 sits on the bottle neck rim 42 (FIG. 3A).

One or more slots 48 are formed radially across the ridge. If more than one slot is formed, preferably the slots are equidistantly spaced along the ridge circumference. Preferably, four slots are formed spaced at 90° intervals around the ridge.

When the cap is threaded onto the bottle, the ridge sits on the rim 42 of the bottle neck. A seal 50 is formed between the ridge and the bottle mouth. The slots, however, provide a path for gas to escape from the bottle through the slots and out through the threaded spiraling space 52 between the inner surface of the cap annular wall and the outer surface of the bottle neck as shown by arrows 54 (FIG. 3A) or arrows 55 (FIG.3B).

In an alternate embodiment, instead of a single ridge, multiple concentric spaced apart ridges 56 are formed (FIG. 4). Again, preferably each ridge should have a diameter that is smaller than the outer diameter of mouth of the bottle to be capped but greater than the inner diameter of the mouth of the bottle to be capped so that they can all mate with the bottle mouth rim 42 when the cap is threaded on to the bottle. At least a single slot 58 is formed radially across each of the ridges. If more than one slot is formed, preferably the slots would be equidistantly spaced around the concentric ridges. The concentric ridges provide multiple ridge surfaces for sealing with the bottle mouth rim, whereas each slot provides a path for venting to the outside.

In another embodiment, multiple concentric spaced apart ridges 60, 62, 64 are formed on the inner surface 46 of the cap top portion (FIG. 5). These ridges form grooves 68 between them. Again, these circular ridges have diameters such that they will sit on the rim 42 defining the mouth of the bottle neck when the cap is torqued onto the bottle. Staggered radial slots 70, 72, 74 are formed across the ridges. Preferably each slot is formed across a single ridge. At least one slot 70, but preferably two, are formed on the innermost ridge 60. When more than one slot is formed on a ridge, the slots should preferably be equidistantly spaced around the ridge.

Similarly, one, or preferably two, slots 72 are formed on the ridge 62 immediately adjacent the innermost ridge 60. The slot or slots 72 should not be aligned with the slots 70 formed on the innermost ridge. If two slots 72 are formed, preferably, they are each located at a 180° from each other and spaced 90° away from slots 70 formed on the innermost ridge 60. One, or preferably two slots 74 are then formed on the next adjacent ridge 64. Preferably, these slots are aligned with the slots 70 formed on the inner most ridge 60. This pattern is preferably repeated until slots are formed on all the ridges formed on the cap top portion inner surface. Alternatively, the location of the slots on each ridge may be arbitrary or may be in any other preselected pattern. Moreover, each slot may span more than one ridge and/or the number of slots penetrating each ridge may be different from ridge to ridge.

When the cap is torqued onto the bottle neck, the ridges are seated on the rim 42 of the bottle neck forming a seal. The slots provide a path for gas to escape. Gas will first escape through the slots 70 formed on the innermost ridge 60 and travel in the groove 68 formed between the innermost ridge 60 and its adjacent ridge 62 until it reaches the slots 72 formed on the adjacent ridge 62 and then escapes through those slots. The gas then follows the various slot and groove paths until it exits through the threaded space 52 between the cap annular wall inner surface and the bottle neck outer surface.

In a further embodiment, grooves 76 may be formed on the inner surface 78 of the cap top portion inner surface 46 (FIG. 6). These grooves should preferably span to the edge 80 of the inner surface, i.e., the location where the inner surface of the cap top portion intersects the annular wall 82 of the cap, or span to at least a location at/or beyond the outer edge of the bottle neck rim 42 when the cap is torqued onto the bottle neck. Preferably, multiple chord-wise grooves are formed across the inner surface 46 of the cap top portion. The grooves may be parallel to each other and may also cris-cross each other. In the embodiment shown in FIG. 6, the grooves cris-cross each other forming squares. When the cap is torqued onto the bottle neck, the inner surface 46 of the cap top will seat against the rim 42 of the bottle neck. The inner surface 46 of the cap top portion will form a seal with the rim 42 of the bottle neck. The grooves 76, however, will provide a path for gasses formed in the bottle to escape across the rim of the bottle neck and through the threaded space 52 between the cap annular wall inner surface and the bottle neck.

The caps of the above described embodiments while allowing gas to vent would also allow some of the liquid to vent if the bottle were turned upside down and squeezed. When squeezed, the liquid material will travel through the slots formed on the ridges and in the later embodiment through the grooves 68. The liquid material would eventually gel in the slots and/or grooves sealing the slots and grooves. Thus, once the gas generated in the bottle has vented, the

slots and/or grooves can be sealed by squeezing some of the liquid material trough the slots or grooves as described above, thereby, preventing the escape of any further liquid from the capped bottle.

With all of these embodiments, the grooves, ridges and slots may be machined into the cap which is typically made of a hard plastic material. Alternatively, the grooves, ridges and slots may also be formed by a molding process. The cap with grooves, or ridges and slots may be formed by a single molding process. Alternative the grooves, or ridges and slots may be formed by a combination of molding and machining processes.

Because the grooves or ridges are made from the same hard plastic material as the cap, they are not susceptible to collapsing when under compression, as for example, when compressed against the rim 42 of the bottle mouth under normal cap torquing conditions.

With any of the aforementioned caps, a liner 84 may be used if necessary (FIG. 7). Typically, the liner will sit against the ridges or the grooved inner surface of the cap top portion. To allow for venting through the liner, at least a hole 80 should be formed through the liner thickness 88. The hole should preferably have a diameter between about 0.010 to 0.015 inch. The liner thickness should preferably be between about 0.015 and 0.020 inch.

Moreover, any of the aforementioned embodiments may be incorporated in non-conventional caps, such as caps having a flip top or a moveable spout. With flip caps 100, the top 120 of the cap is hingedly connected to the annular wall or rim 126 of the cap (FIG. 8). In this regard, the top can be flipped open to allow for the pouring out of the contents of the bottle. With spout caps 200, a spout 90 is incorporated on the cap top portion 220 of the cap 200 (FIG. 9). The spout can be rotated from a closed position 90 to an open position 92. When in an open position, a path is provided allowing for the pouring out of the contents of the bottle. With either type of cap, the ridges or grooves are also formed on the inner surface of the cap top portion as described herein.

Furthermore, the ridges or grooves may be formed, preferably by a molding or a machining process, on a disc 300 made from a hard or semi-hard material such as plastic (FIG. 10). The disc is sized such that it can fit and sit against the inner surface 46 of the cap top portion 24 and such that the ridges 344 or grooves can mate with the bottle neck rim 42 which defines the bottle mouth 40 as described above. In this regard the disc may be used with conventional caps to provide the necessary venting so as to prevent bottle paneling. Moreover, since the disc is made from a hard or semi-hard material, the risk of collapsing of the ridges of grooves which may prevent the venting of gases is decreased. The thickness of the disc should preferably be in the order of 0.030 inch. The disc may be glued to the inner surface of the cap top portion using an adhesive compatible with the contents of the bottle.

The ridges 44 of grooves are formed on one surface 302 of the disc, with the opposite surface 304 being flat (FIGS. 10 and 11). In one embodiment, the disc can is mated to the cap with its flat surface 304 against the cap top portion 24 inner surface 46 (FIG. 10). In another embodiment, the disc is mated to the cap with its ridged or grooved surface 302 against the inner surface 46 of the cap top portion (FIG. 11). With this embodiment, the flat surface side of the disc mates with the bottle mouth when the cap is torqued onto the bottle. Moreover, with this embodiment, the diameter of the disc should be smaller then the inner diameter of the cap annular wall 26 such that a gap 306 is defined between the annular wall 26 and the disc edge 308. An opening 310 is formed through the thickness of the disc to allow the gases generated in the bottle to travel from the bottle through the opening and to the grooved or ridged surface 302 of the disc. From there the gas travels in the grooves or through the slots in the ridges and through the gap and through to the threaded space 52 (FIG. 3) between the cap annular wall inner surface and the bottle neck outer surface.

With this latter embodiment, i.e., the embodiment where the ridged surface is mated to the inner surface of the cap top portion, the ridges act as a spacer to separate the disc from the inner surface of the cap top portion. Moreover, with this embodiment, to prevent the bending of the disc when the cap is threaded onto the bottle, the disc should be positioned such that a ridge is located over the bottle neck rim 42.

CLAIMS

1. A bottle cap comprising:
a top portion having an inner surface;
an annular wall extending from the top portion;
a circular ridge formed on the top portion inner surface; and
at least a slot formed across the ridge.

2. A bottle cap as recited in claim 1 for capping a bottle mouth having a rim, wherein the circular ridge is formed on the inner surface of the top portion for registering with the rim.

3. A bottle cap as recited in claim 2 comprising a plurality of concentric ridges, wherein at least one slot is formed across all the ridges.

4. A bottle cap as recited in claim 2 comprising a plurality of concentric ridges, wherein at least one slot is formed across each ridge.

5. A bottle cap as recited in claim 4 wherein the slot formed across one ridge is circumferentially spaced apart from a slot formed across an adjacent ridge.

6. A bottle cap as recited in claim 2 further comprising a liner fitted over the top portion inner surface, the liner having an opening formed through the liner thickness.

7. A bottle cap as recited in claim 2 wherein the top portion is hingedly coupled to the annular wall.

8. A bottle cap as recited in claim 2 further comprising a moveable spout extending from the top portion.

9. A bottle cap comprising:
a top portion having an inner surface;
an annular wall extending from the top portion; and
a groove formed on the inner surface of the top portion.

10. A bottle cap as recited in claim 9 comprising a plurality of grooves formed on the inner surface of the top portion.

11. A bottle cap as recited in claim 10 comprising:

a first set of parallel spaced apart grooves; and

a second set of parallel spaced apart grooves, wherein grooves of the first set intersect grooves of the second set.

12. A bottle cap as recited in claim 10 further comprising a liner fitted over the top portion inner surface, the liner having an opening formed through its thickness.

13. A bottle cap as recited in claim 9 wherein the top portion is hingedly coupled to the annular wall.

14. A bottle cap as recited in claim 9 further comprising a moveable spout extending from the top portion.

15. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the of the annular wall;

a circular ridge formed on the inner surface of the top portion; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the ridge sits on the bottle neck rim and the slot forms a pathway for gas generated in the bottle to escape across the bottle neck rim and through the gas path.

16. A vented bottle cap system as recited in claim 15 comprising:

a plurality of concentric ridges formed in the inner surface of the top portion, wherein when the cap is threaded onto the bottle neck, the plurality of ridges contact the bottle neck rim; and

at least a slot in each ridge, wherein a slot in each ridge is radially aligned with a slot in an adjacent ridge.

17. A vented bottle cap system as recited in claim 15 comprising:

a plurality of concentric ridges formed on the inner surface of the top portion, wherein when the cap is threaded onto the bottle neck, the plurality of ridges contact the bottle neck rim; and

at least a slot across each ridge, wherein a slot in each ridge is circumferentially spaced apart from a slot in an adjacent ridge.

18. A vented bottle cap system as recited in claim 15 further comprising a liner fitted in the cap and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner sits on the bottle neck rim and wherein gases generated in the bottle escape through the hole, through the slot and through the gas path.

19. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall; and

a groove formed on the inner surface of the top portion wherein when the cap is threaded onto the bottle neck, the groove extends radially beyond the rim of the bottle neck providing a pathway for gas generated in the bottle to escape across the bottle neck mouth and through the gas path.

20. A vented bottle cap system as recited in claim 19 comprising a plurality of grooves formed on the inner surface of the top portion, wherein each groove extends radially beyond the rim of the bottle neck when the cap is threaded onto the bottle neck.

21. A vented bottle cap system as recited in claim 20 comprising a first set of parallel grooves and a second set of parallel grooves formed on the inner surface of the top portion, wherein grooves of the first set intersect grooves of the second set.

22. A vented bottle cap system as recited in claim 19 further comprising a liner fitted in the cap and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner sits on the bottle neck rim and wherein gases generated in the bottle escape through the hole, through the groove and through the gas path.

23. A method for venting gases generated in a bottle having a rim defining a mouth and containing a liquid, the method comprising the steps of:

providing a cap having a top portion, a circular ridge formed on an inner surface of the top portion and a slot formed across the ridge; and

torquing the cap on the bottle causing the ridge to sit on the rim, wherein the slot provides a pathway for the venting of gases.

24. A method as recited in claim 23 further comprising the steps of:

forcing liquid in the slot; and

solidifying the liquid to block the pathway through the slot.

25. A method for venting gases generated in a bottle having a rim defining a mouth and containing a liquid the method comprising the steps:

providing a cap having a top portion and a groove formed on an inner surface of the top portion; and

torquing the cap on the bottle causing the inner surface of the top portion to sit on the rim, wherein the groove provides a pathway for the venting of gases.

26. A method as recited in claim 25 further comprising the steps of:

forcing liquid in the groove; and

solidifying the liquid to block the pathway through the groove.

27. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a disc made of a material being at least semi hard fitted over the top portion inner surface, the disc having a first surface opposite a second surface, wherein the first surface faces the top portion inner surface;

a circular ridge formed on the second surface of the disc; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the ridge sits on the bottle neck rim and the slot forms a pathway for gas generated in the bottle to escape across the bottle neck rim and through the gas path.

28. A vented bottle cap system as recited in claim 27 comprising:

a plurality of concentric ridges formed in the second surface of the disc, wherein when the cap is threaded onto the bottle neck, the plurality of ridges contact the bottle neck rim; and

at least a slot in each ridge.

29. A vented bottle cap system as recited in claim 28 wherein at least a slot in each ridge is radially aligned with a slot in an adjacent ridge.

30. A vented bottle cap system as recited in claim 27 further comprising a liner fitted in the cap over the disc and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner is sandwiched between the ridge and the rim and wherein gases generated in the bottle escape through the hole, through the slot and through the gas path.

31. A vented bottle cap system as recited in claim 27 wherein the disc is made from plastic.

32. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and having threads formed on the bottle neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck outer surface, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a disc made of a material being at least semi hard fitted over the top portion inner surface, the disc having a first surface opposite a second surface, wherein the first surface faces the top portion inner surface;

a groove formed on the second surface of the disc wherein when the cap is threaded onto the bottle neck, the groove extends radially beyond the rim of the bottle neck providing a pathway for gas generated in the bottle to escape across the bottle neck mouth and through the gas path.

33. A vented bottle cap system as recited in claim 32 comprising a plurality of grooves formed on the second surface of the disc, wherein each groove extends radially beyond the rim of the bottle neck when the cap is threaded onto the bottle neck.

34. A vented bottle cap system as recited in claim 32 comprising a first set of parallel grooves and a second set of parallel grooves formed on the second surface of the groove, wherein grooves of the first set intersect grooves of the second set.

35. A vented bottle cap system as recited in claim 32 wherein the disc is made from plastic.

36. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck outer surface, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a disc made from a material being at least semi hard fitted over the top portion inner surface, the disc having a circumferential edge and a first surface opposite a second surface, wherein the first surface faces the top portion inner surface;

a gap between the annular wall and the circumferential edge;

an opening formed through the thickness of the disc, the opening located within the bottle mouth when the cap is threaded onto the bottle neck;

a circular ridge formed on the first surface of the disc; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the ridge is located over the bottle neck rim and the opening and slot form a pathway for gas generated in the bottle to escape across the bottle neck and through the gas path.

37. A bottle cap liner disc for use with cap for capping a bottle having a rim defining a bottle mouth and having an inner and an outer diameter, the disc allowing for the venting of gases generated in a bottle when the cap is threaded on the bottle, the disc comprising:

a first surface opposite a second surface;

a circular ridge formed on the first surface of the disc; and

a slot formed across the ridge.

38. A disc as recited in claim 37 wherein the ridge has a diameter not greater than the outer diameter of the rim and not less than the inner diameter of the rim.

39. A disc as recited in claim 37 wherein the disc has a thickness, the disc further comprising an opening formed through its thickness.

40. A disc as recited in claim 37 made from a material being at least semi-hard.

VENTING CAP

ABSTRACT OF THE DISCLOSURE

A bottle cap is provided that allows for venting of gases generated in a bottle. A single or multiple ridges are formed on the inner surface of the cap top such that the ridges sit on the bottle mouth rim when the cap is threaded onto the bottle. A single or multiple slots may be formed across each of the ridges. Alternatively, a single or multiple grooves may be formed on the inner surface of the cap top. The ridge(s) or groove(s) may also be formed on a disc fitted over the inner surface of the cap top. When the cap is threaded on to the bottle, gases generated in the bottle can escape through the slot(s) formed across the ridge(s) or through the groove(s) formed on the inner surface of the cap top. A liner having an opening formed through its thickness may be placed in the cap. The liner opening allows the passage of gases from the bottle to the slot(s) or groove(s) formed on the cap top or disc.

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FIG. 1
PRIOR ART

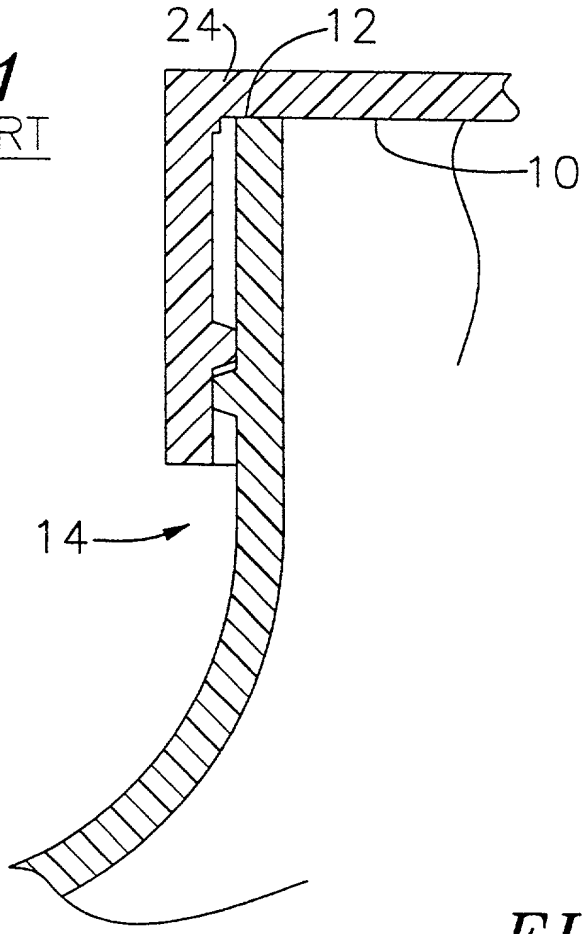


FIG. 3B

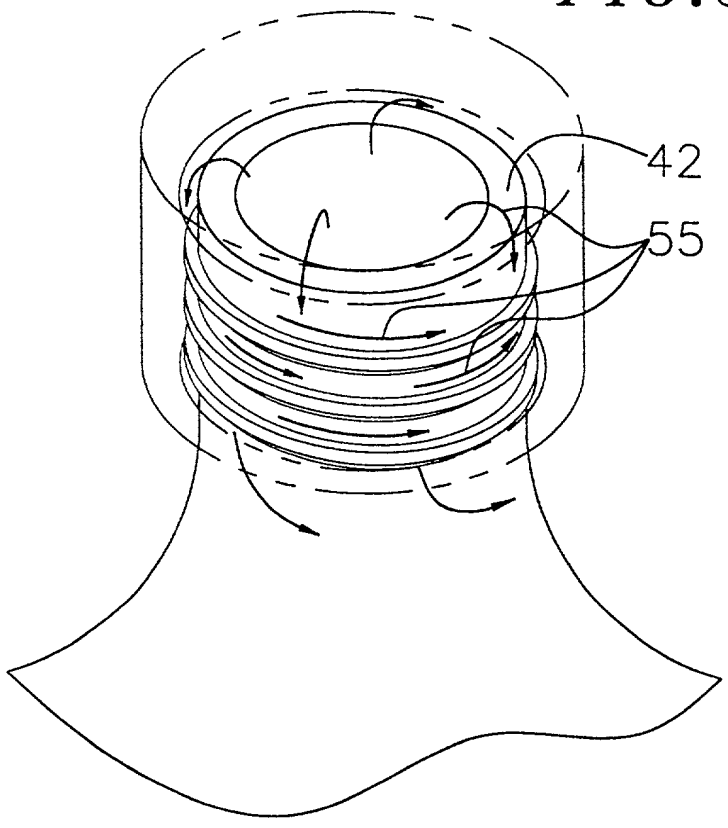


FIG. 2

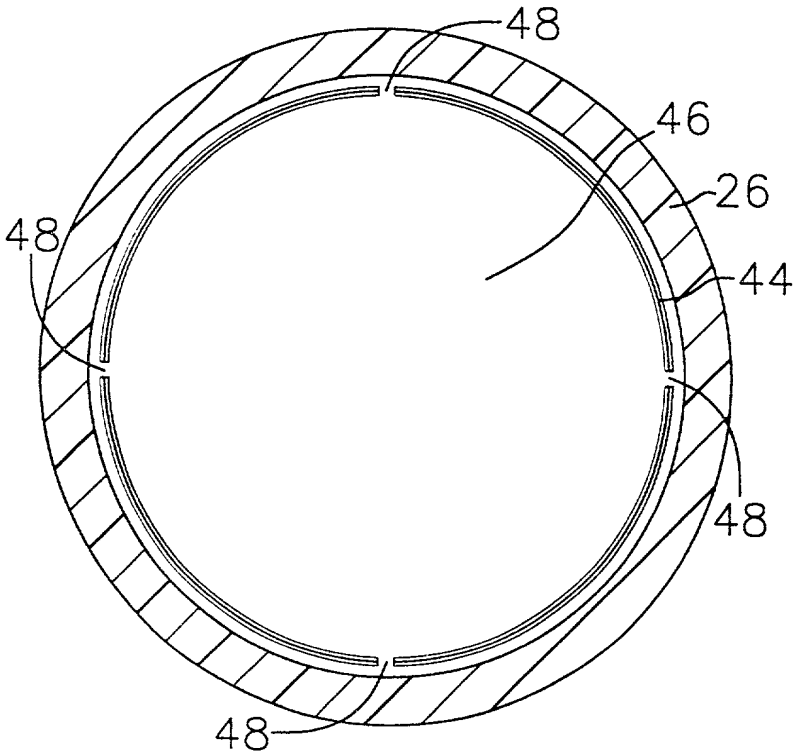


FIG. 3A

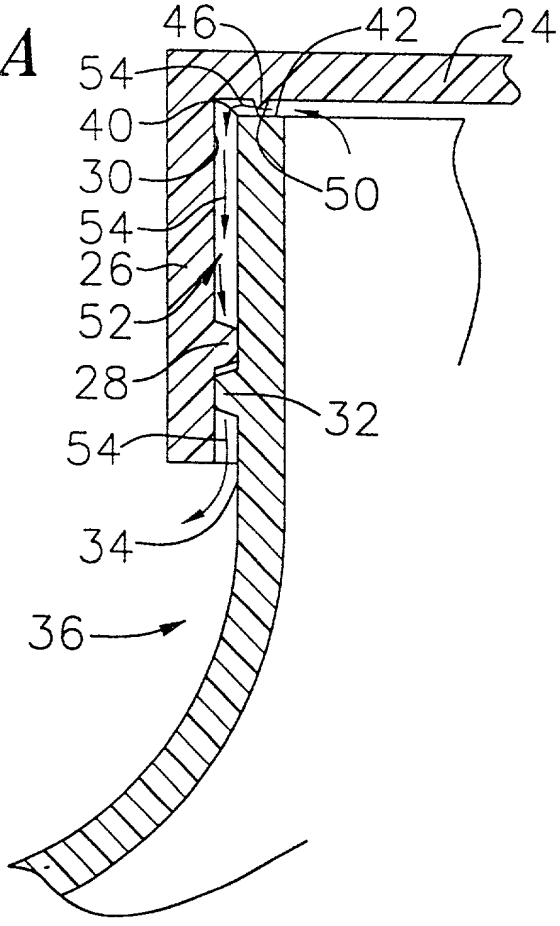


FIG. 4

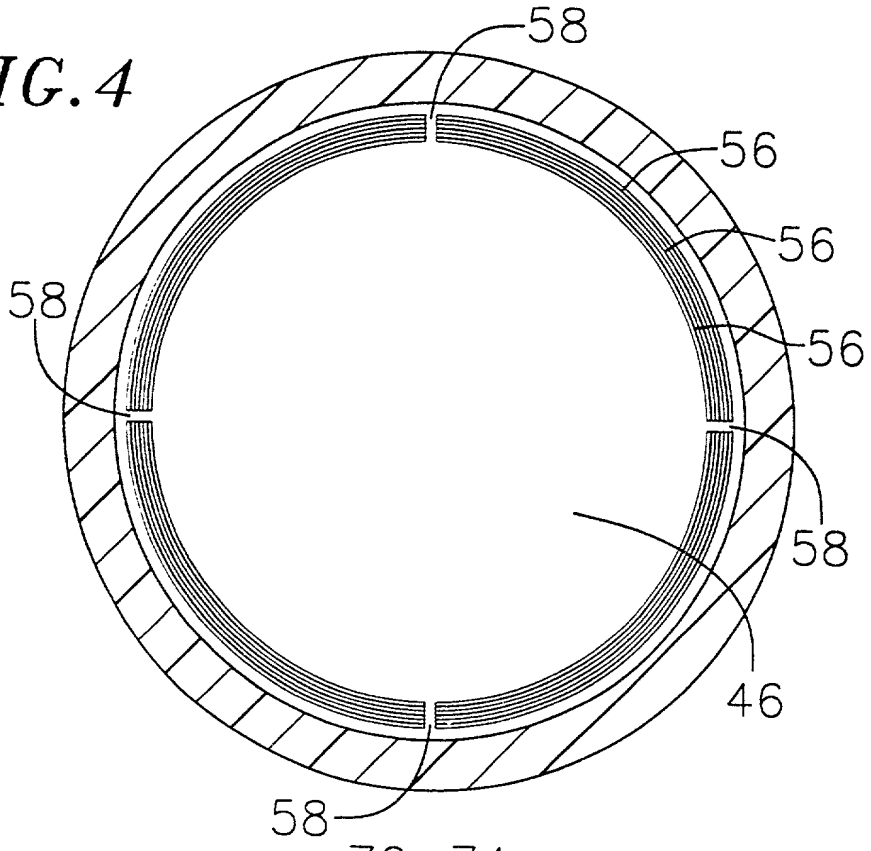


FIG. 5

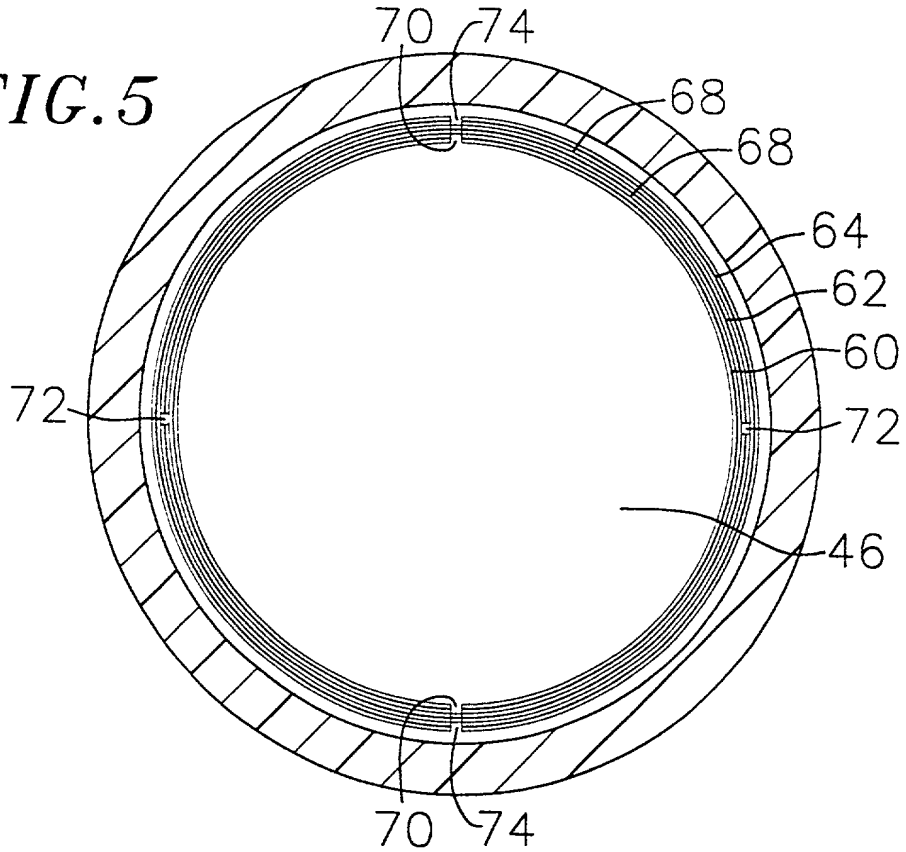


FIG. 6

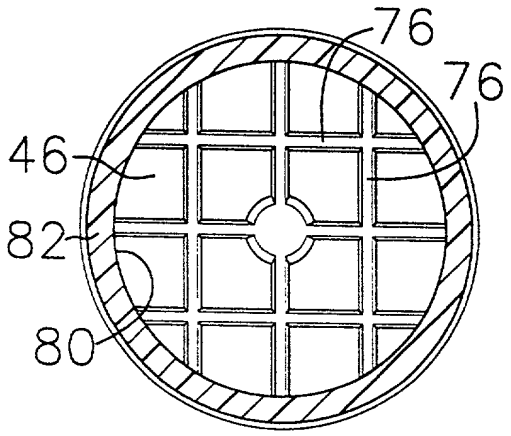


FIG. 7

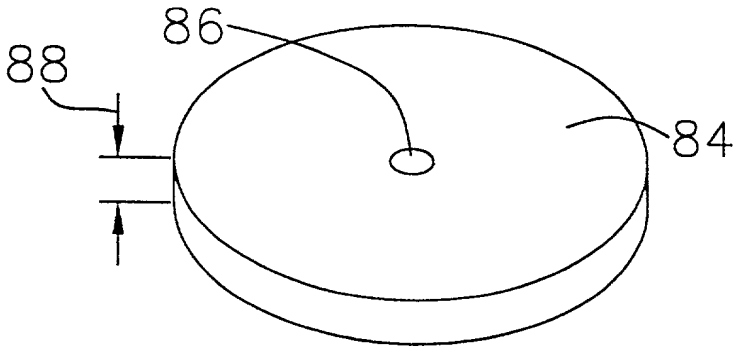


FIG. 8

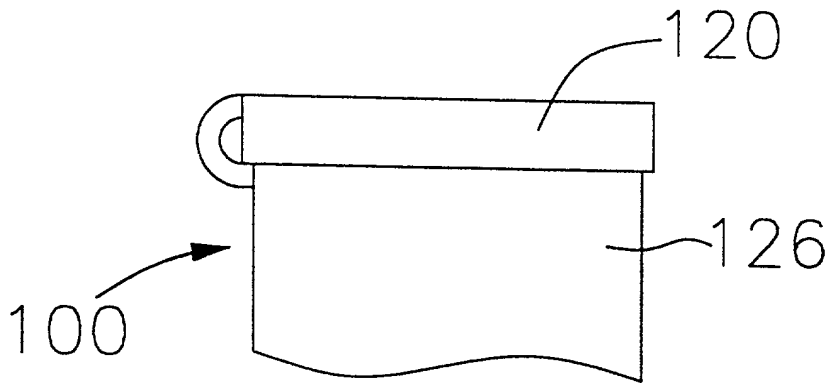


FIG. 9

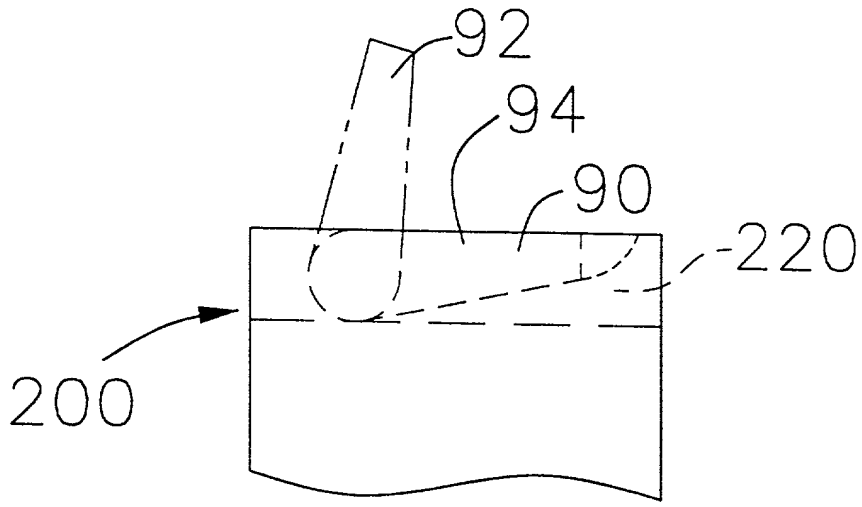


FIG. 10

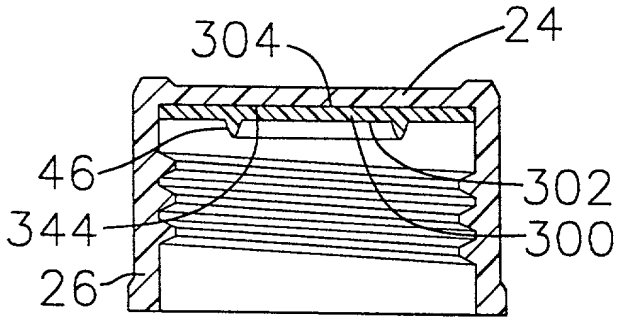


FIG. 11

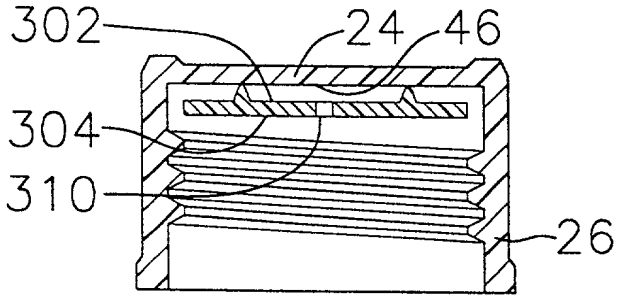
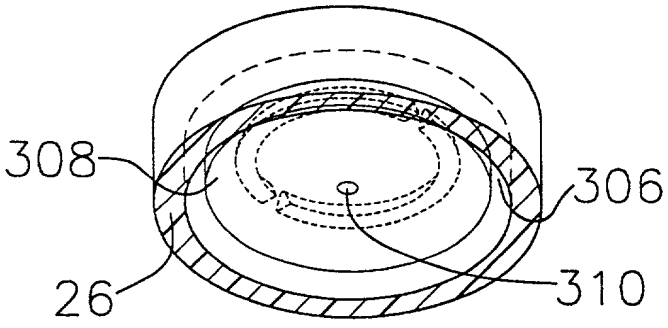


FIG. 12



DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS PATENT

Docket No. : 32711/CM/P369

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled VENTING CAP, the specification of which is attached hereto unless the following is checked:

__ was filed on __ as United States Application Number or PCT International Application Number __ and was amended on ___ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of the foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Application Number	Country	Filing Date (day/month/year)	Priority Claimed

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

Application Number	Filing Date

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

Application Number	Filing Date	Patented/Pending/Abandoned

POWER OF ATTORNEY: I hereby appoint the following attorneys and agents of the law firm CHRISTIE, PARKER & HALE, LLP to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application; or

from the first or sole inventor named below in the event the application is not assigned; or from __ in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

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I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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